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**Commentaries**

# Gender and the environment: Increasing enterprise productivity and improving occupational safety and health conditions

*Le genre et l'environnement : augmenter la productivité des entreprises et améliorer la sécurité et la santé au travail*

*Género y medio ambiente: incremento de la productividad de la empresa y mejora de las condiciones de seguridad y salud laboral*

**Maria Sabrina De Gobbi**

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FACTS Reports

COMMENTARY

# Gender and the environment: Increasing enterprise productivity and improving occupational safety and health conditions

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The author has been working at the International Labour Organization since 1998. Her work experience focuses on developing countries and covers areas such as access to financial services for the poor, microfinance, mutual guarantee financial schemes, cooperatives, labour markets and employment policies in developing countries, labour market flexibility and security, active labour market policies and the evaluation of their impacts on employment creation, enterprise development, the enabling environment for sustainable enterprises, and the gender dimension in all of those areas. Over the past three years, environmental issues have become a relevant component in her work. She has authored and co-authored publications in all of the above-listed topics.

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**Abstract.** This paper tries to establish linkages between gender and the environment. The approach which has been chosen is that of occupational safety and health (OSH) and environmental protection. An attempt is made to shed light on the conditions of female employees as compared to their male colleagues in terms of environmental tasks assigned, injuries suffered and accidents linked to machines which may be hard to use particularly for female workers. A survey of 100 employees from 10 firms from the manufacturing of machine-parts sector in China and Indonesia was conducted to investigate the issues. In Indonesian surveyed enterprises, women experience more injuries than men. Both in China and in Indonesia, accidents due to machines which are hard to use for a worker concern men more than women. Findings from China reveal that even if women are better than men in the implementation of environmental protection measures, they are simply denied a chance to show it, because they are under-represented in management positions and it is by being in top-management jobs that one can make a difference in environmental protection. This result has direct implications in terms of missed opportunities in productivity gains for enterprises.

**Keywords.** occupational safety and health, work injuries, work accidents, environmental protection, women employees

## Background

### 1 Objective and purpose

This paper tries to establish linkages between gender and the environment. The approach which has been chosen is that of occupational safety and health (OSH) and environmental protection. Preventing work-related accidents and encouraging safe work practices have the dual positive effect of protecting workers' health as well as the environment. Preventing accidents through the sound use of machines and clean work practices safeguard the environment from dangerous spills,


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emissions and damage.

The main objective of the research activity described in the present paper is to shed light on the conditions of female employees as compared to their male colleagues in terms of environmental tasks assigned, injuries suffered and accidents linked to machines which may be hard to use particularly for female workers. Three research questions have been addressed using data obtained through a survey of 100 employees from 10 firms per country which participate in a project of the International Labour Organization (ILO).

The selected ILO project is titled "Sustaining Competitive and Responsible Enterprises" (SCORE). It deals with sustainable enterprises to pursue decent work in seven developing countries. The countries which have been chosen for this investigation are China and Indonesia, and the sector which the research focuses on is manufacturing of machine parts.

## 2 Security & productivity

Occupational injuries and deaths have a negative impact on productivity as well as on social and economic development. The majority of accidents are not reported and not known to the public because they have minor effects. However, taken all together, those smaller accidents can have devastating social, economic and environmental impacts. To quantify costs to enterprises and society at large, one can consider a major catastrophe like the Bhopal accident which occurred in India in 1984. Over 20,000 people have died as a consequence of the injuries they received. Moreover, costs for the owners amounted to approximately US$500 million in compensation.[1]

The International Labour Organization has adopted several legal instruments for the promotion of a safe and healthy work environment. The latest ones are the Promotional Framework for Occupational Safety and Health Convention no. 187 of 2006, and its accompanying Recommendation 197. These instruments encourage countries to adopt national OSH programmes, establish a preventive safety and health culture, and apply a system approach to the management of OSH. On national OSH policy and action at the national and enterprise level, conventions 155 and 161, and recommendations 164 and 171 are also relevant.

## 3 Occupational safety and health risks for men and women

The international literature on female workers, occupational safety and health, and environmental protection is scarce. It is almost non-existent if we consider the specific sector covered in the present paper, which is manufacturing of machine parts.

Starting from available data on both fatal and non-fatal injuries by gender in the manufacturing sector, for all countries considered, both developing and developed ones, men experience more injuries than women. For example, in Mauritius reported injuries were 6.3 in 2004 and 5.4 in 2008 for men per only one injury for women in the same years; in Poland, 4.9 and 4.1 injuries were reported for men per one injury for women in the same years.[2]

Unfortunately, specific data for China and Indonesia is scarce. Between 1995 and 1997, reported injuries, both fatal and non-fatal, in the manufacturing sector in China rose from 4,142 to 4,384. During the same period in Indonesia both fatal and non-fatal compensated injuries in the same sector decreased from 8,678 to 4,486.[3] It also appears that in China, during the period 1994-2000 half of recorded traumatic injuries of the hand were work-related, with machinery workers being among the job categories at increased risk of inducing hand injuries. Punch, electric saw and planer, and knives were the tools usually causing hand injuries. The most of these accidents occurred in enterprises owned by townships and in small private businesses. The principal causes of hand injuries seemed to be inadequate OSH training, fatigue and distraction, poor functioning of machines, lack of cooperation among workers, and absence of preventive measures.[4] Moreover, a survey conducted in 2008 in Eastern Chinese cities reveals that the safety climate level perceived by employees in the manufacturing sector was low, and more so in small enterprises than in large ones. Lack of safety training and management support were the two main causes accounting for this result.[5] Regrettably, available data is not disaggregated by gender.

In general, men are employed in jobs that expose them to accidents more than women. This is why they are more likely to experience fatal accidents and other work-related deaths. It also seems that men tend to adopt less preventive and protective ways of performing work assignments than women.[6]

In 2006, the All China Federation of Trade Unions organized a national survey on the occupational safety and health situation of women workers. The working conditions and OSH situation of Chinese female employees turned out to be worrisome, particularly in small and medium-sized enterprises. Problems identified include poor and unsafe working conditions, lack of safety measures, injuries, ill health and poisoning, long and extra working hours, and heavy workloads.[7]

## 4 Gender and environmental protection

Over the past four decades, researchers have conducted extensive work on the conceptualization and measurement of personal environmental concern. Individual behaviour seems to be shaped by gender expectations and cultural norms.[8]

1 International Labour Organization, "Occupational Safety and Health: Synergies between Security and Productivity", Governing Body Committee on Employment and Social Policy, Geneva, 2006.

2 ILO Laborsta.

3 Ibid.

4 He, Y.; Liang, Y., "Work-Related Hand Injury in China and Initiatives to Study the Factors Affecting Return-to-Work after Injury", Asian-Pacific Newsletter on Occupational Health and Safety, April, 15(1), 2008.

5 Ma, Q.; Yaun, J., "Exploratory Study on Safety Climate in Chinese Manufacturing Enterprises", Safety Science, 47, 2009.

6 International Labour Organization, "ILO's Decent Work: Providing Safe and Healthy Workplaces for both Women and Men", Geneva, 2009.

7 Zhu, C., "Labour Protection for Women Workers in China", Asian-Pacific Newsletter on Occupational Health and Safety, December, 15(3), 2008.

8 Hunter, L.M.; Hatch, A.; Johnson, A., "Cross-National Gender Varia-

It is suggested that model of Career Choice and Work Behaviour, childhood play, household chores, and early paid work experience are differentiated by gender. These differences produce differentiated skills, perceptions of one's job role and impressions of what activities can best satisfy various human needs.[9] As a consequence, women tend to take on roles as caregivers and nurturers. Furthermore, they have shown to value altruism which is then associated to environmental behaviours.[10]

Evidence shows that women have greater commitment to environmentalism relative to men. They have higher relative levels of environmentally-friendly behaviours in regular daily routines. For example, women recycle, buy organic produce, save energy, reuse objects more than men. Research suggests that these general gender-based environmental behaviours exist cross-culturally.[11] Furthermore, women are more concerned about the environment than men at every age.[12]

Following these lines of reasoning, it is natural to expect that while at work, women would be more involved in environmentally-friendly behaviours. This is confirmed by the fact that women traditionally work at home more than men and enjoy a greater likelihood to engage privately in environmentally-friendly behaviours, including at the workplace rather than in the public domain.[13]

It seems that voluntary compliance in terms of environmentally-friendly behaviours is primarily driven by social norms or preferences for environmental protection. Willingness to contribute to the environment which is stronger in women is especially useful in situations where it is very expensive to set up an enforcement system for environmental protection. As a consequence, voluntary compliance lowers the cost of operations.[14]

## Methodology

The research questions addressed are the following:

- Are women exposed to greater occupational safety and health risks than men?
- Is machinery/equipment adjusted to women?
- Are women assigned more housekeeping tasks and environmental protection measures than men in firms?

A survey is the main instrument which has been chosen to answer the research questions. It has been conducted in 10 companies in Indonesia and 10 in China participating in the SCORE project from the manufacturing of machine-parts sector. The specific geographical areas where the survey was carried out are Jakarta in Indonesia and Chengdu, in the Sichuan province in China.

If we consider the International Standard Industrial Classification of All Economic Activities, there is no specific sector called "manufacturing of machine parts". However, the economic activities included in that sector and listed in the International Standard Industrial Classification are Manufacture of chemicals and chemical products; Manufacture of fabricated metal products, except machinery and equipment; Manufacture of machinery and equipment not elsewhere classified; Manufacture of electrical machinery and apparatus not elsewhere classified; Manufacture of other non-metallic mineral products; and Manufacture of motor vehicles, trailers and semi-trailers. It is to be added that the SCORE project covers industrial clusters rather than economic sectors. This is why sometimes, as in the case of China, even a firm operating in the area of concrete has been surveyed.

In general and whenever possible, 10 employees per firm have been interviewed. This is a reasonable number in Indonesia, where 9 of the 10 surveyed enterprises have 150 employees or less, with 3 of them having 50 or less. In China, surveyed firms are much larger, with 7 of them employing more than 250 people. The sample size in this case is therefore somewhat less representative.

In Indonesia, of the 100 interviewees, 51 are men and 49 women, whereas in China, interviewees consist of 66 men and 34 women.

The questionnaire was developed by ILO and SCORE technical staff and has been conceived for use by enterprises in different sectors and countries. It is relatively short and consists of fourteen questions. Nine questions are to be answered by the employees. The other five concern the company and are to be answered by management.

Questions have been formulated as closed ones, in order to make the process of collecting answers as speedy as possible, with the intention of avoiding the disruption of enterprise activity. A limit of this choice is that open questions would have offered a wider range of information and a broader body of knowledge about recorded experiences.

Interviews were to be held on a one-to-one personal level. Since some gender-related issues were considered to be rather sensitive, especially for women, a female national consultant was recruited for conducting the interviews in both countries.

During the implementation phase some differences emerged between the two countries. The Indonesian interviewer felt that people were more willing to disclose important information when they were in informal group situations. It was estimated that particularly women were more open to providing sensitive information when they were not alone with the interviewer. Groups of employees were therefore sometimes approached during their break time, in social, informal moments.

In China the consultant was not free to

tion in Environmental Behaviors", Social Science Quarterly, The Southwestern Social Science Association, 85(3), 2004.

9 Astin, H. S., "The Meaning of Work in Women's Lives: A Sociopsychological Model of Career Choice and Work Behavior", The Counselling Psychologist, 12 (4), 1984.

10 Perun, P. J.; Bielby, D., "Towards a Model of Female Occupational Behaviour: A Human Development Approach", Psychology of Women Quarterly, 234-252, 1981.

11 Hunter et al, 2004.

12 Torgler, B.; García Valiñas, M.A.; Macintyre, A., "Differences in Preferences towards the Environment: The Impact of a Gender, Age and Parental Effect", The Fondazione Eni Enrico Mattei, Note di Lavoro Series, 2008.

13 Ibid.

14 Ibid.

choose her interviewees. Companies provided her with lists of employees who had been selected for being interviewed. In this case, questionnaires were indeed filled through one-to-one personal interviews.

The surveys were carried out during the month of September 2011. A pilot phase focusing on 2 companies and 20 interviews was also organised in order to test the questionnaire in Indonesia. No relevant issue was recorded and no change was therefore made to the questionnaire. The analysis of the answers was carried out at ILO head-quarters in Geneva during the month of October 2011 and its results are contained in the present report.[15]

## Results and discussion

The following sub-sections will address each one of the three research questions by country. Results of data analysis and findings will be presented, and emerging issues discussed.

### 1 Are women exposed to greater OSH risks than men?

Occupational safety and health risks for both men and women have been measured through injuries suffered over the past 3 years.

Following the ILO Convention and Recommendation concerning Benefits in the Case of Employment Injury, No. 121, adopted in 1964, employment injuries can be defined as all injuries resulting from accidents arising out of or in the course of employment (industrial accidents and commuting accidents) and all occupational diseases.

It is useful to refer also to the Resolution concerning statistics of occupational injuries

**Figure 2.** Female worker at her station with no protective headgear and dangerously close to a rotating wheel. (*Copyright: Mila Gustia*)

resulting from occupational accidents, adopted by the Sixteenth International Conference of Labour Statisticians in 1998.[16] An occupational accident is defined as "an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers incurring a personal injury, disease or death". Commuting accidents to the workplace are included in this definition. Furthermore, an occupational injury is considered to be "any personal injury, disease or death resulting from an occupational accident".

#### 1.2 Indonesia

Over the past 3 years, surveyed companies in Indonesia have recorded a total of 120 injuries among their employees. The figure is quite different from experiences reported by employees. Interviewees reveal that they have experienced 629 injuries in total over the same period of time, with women suffering 415 and men 214.

On average, women have reportedly experienced 8.47 injuries over the past 3 years, whereas their male counterpart revealed having suffered only 4.2. This striking result somehow contradicts findings from the international literature and secondary data presented in section 1.3. An explanation can be the fact that manufacturing of machine parts, a sector where injuries may not be unusual events, is not a sector where women have been and are traditionally employed.

For both men and women, the mode is 0. This means that the majority of both female and male employees have not experienced any injury over the past three years. It therefore seems evident that there are specific groups of employees who are exposed to a relatively high number of injuries compared to their colleagues. Who are they?

There may be a difference in the number of injuries for women workers employed in companies with 50 workers or less (3 out of 10) compared to female employees in enterprises with more than 50 workers. Data show that on average, women working in smaller firms have experienced 3.6 injuries, and female employees of larger companies have suffered on average 9.7. It appears that also men experience more injuries when they are employed in larger firms. Male employees working in enterprises with 50 employees or less have experienced on average 3.3 injuries as opposed to men in larger companies who have suffered 4.8.

The findings described above seem to somehow contradict international literature according to which small firms tend to have lower levels of occupational safety and health standards and expose employees to higher risks. Financial constraints, lack of knowledge, adequate skills and awareness are some of the issues which small firms face.[17] Nonetheless, it is to be noted that in general, companies surveyed in Indonesia are rather small in size, with 9 of them employing 150 people or less.

Another factor which could account for the different

15 Some hypotheses were tested using the chi-square test, in particular to answer the first research question listed above. The chi-square test has been chosen because it is a non-parametric test based on no assumptions regarding data distribution, it allows observations about two independent variables to be grouped into two or more categories, and observations must be counts as in our case.

16 http://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_087528.pdf

17 See Dimopoulos, V. A., "Effective Information Assurance with Risk Management", (PH.D. dissertation), Plymouth UK, 2007; and Rautio, S., "Occupational Safety and Health in the South Pacific", Asian-Pacific Newsletter on Occupational Health & Safety 1(3), 1994.

number of injuries suffered by a specific group of employees is age. The average age for all interviewees is 29.7. All interviewees have therefore been divided into two groups, below and above the age of 30.

Data analysis shows that on average, employees aged under 30 have experienced 8.24 injuries over the past three years, as opposed to those aged 30 and above who have suffered from 4.85. If we then consider women and men under 30 and aged 30 and above, again, young female employees are more likely than their male counterpart to suffer from injuries. On average, women under 30 have suffered from 9.56 injuries over the past three years, whereas their male colleagues of the same age group have recorded an average of 6.23 injuries over the same period.[18] The following chart clearly illustrates the situation.

Professional experience gained with years of work could be a very helpful element in preventing injuries, which could explain the findings described above. Likewise, career progression linked to age and seniority may transfer employees away from more dangerous positions towards jobs which are safer and less close to practical activities.

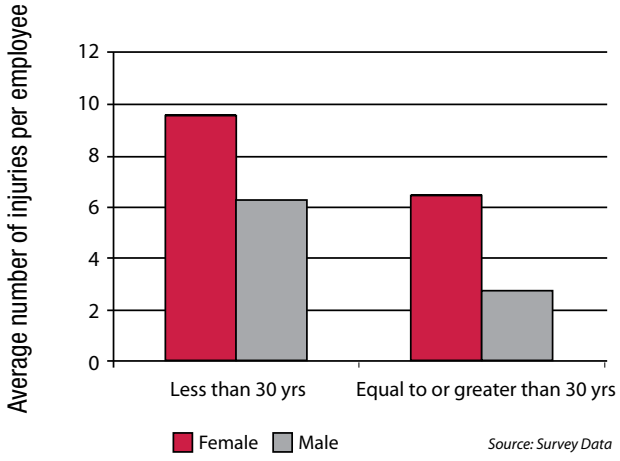


**Figure 3.1.** Work-related injuries suffered by women and men over the past 3 years by age group.

To find out whether this latter idea may make any sense, all interviewees have been divided into two groups: Those that can be called «workers» and who are more involved in practical activities and production, often entailing the use of machineries, and non-workers including managers, owners, supervisors, administration staff, human resource development, inspectors and quality control staff. If we focus on women, on average, worker women have experienced 11.34 injuries over the past three years, as opposed to female non-workers who have experienced 5.92. Clearly being a «worker» is associated with a higher level of risk to experience an injury. If we then focus on women workers under 30, the average number of injuries suffered over the past three years rise to 12.64, thus showing that being a young female worker exposes an employee to further physical risk.

18 The difference between the two age groups divided by gender is confirmed by a rather high degree of statistical significance (0.00123577 with P=0.05).

### 1.3 China

Over the past 3 years, surveyed companies have recorded a total of 88 injuries among their employees. Surprisingly, unlike in the case of Indonesian interviewees, Chinese surveyed employees report having suffered from far fewer injuries than those officially recorded by their employers. They reveal having experienced only 4 injuries in total over the same period of time.

This interesting finding may be due to the fact that the employees selected by the companies to be interviewed are those who have not experienced many injuries. In addition, the selected sample of interviewees is less representative for China than it was in the case of Indonesia. As a matter of fact, most Chinese surveyed firms employ more than 250 people, whereas Indonesian surveyed companies are overall smaller in size.

Moreover, one cannot exclude that the different cultures may determine a higher degree of openness of Indonesian interviewees as compared to Chinese ones in revealing what could cause problems with their employers. The fact that the number of accidents witnessed by Chinese employees (see section 3.2) is much higher than the number of injuries suffered may be seen as supporting this idea.

All 4 injuries were suffered by men, of whom 2 were workers and 2 were line supervisors. Considering the overall low number of injuries, it is deemed unnecessary to investigate on the size of the enterprises where those male workers are employed, or on further personal characteristics of those employees.

## 2 Is machinery/equipment adjusted to women?

This question has been addressed by considering the number of accidents due to a machine/equipment which is hard to use for a worker.

Following the ILO Convention and Recommendation concerning Benefits in the Case of Employment Injury, No. 121, both adopted in 1964, work accidents can be defined as accidents occurring at or in the course of work which may result in death, personal injury or disease.

Accidents may have a negative impact on the environment and this is why they are being considered in this research. If they are caused by machines and/or equipment which are hard to use, in particular for a female worker, a direct link between gender and the environment can be established.

### 2.1 Indonesia

Surveyed companies In Indonesia have recorded 45 accidents. The picture is quite different according to interviewees who, over the same period, have witnessed a total of 401 accidents caused by a machine/equipment which was hard to use for a worker. Since interviewees were asked to report on witnessed accidents, such a high total number may be due to the same accident being reported by more than one employee. However, the low number of accidents reported by firms is particularly striking because such number should include all kinds of accidents and not only those which are due to a ma-

chine/equipment which is hard to use for a worker.

As for injuries, the larger size of enterprises seems to be a factor determining a higher level of accidents in Indonesia. As a matter of fact, over the past three years, an average of 3.4 accidents due to a machine/equipment which was hard to use for a worker have been witnessed in firms employing 50 people or less as opposed to an average of 4.3 witnessed in larger companies over the same period. The difference is however not so relevant.

Out of the 401 total witnessed accidents in Indonesian companies, 117 happened because a female worker found it hard to use a machine/equipment. Accidents due to a machine/equipment which are hard to use for a worker do happen, but they concern more male employees than female ones. This could be due to the small size of men which could make machinery difficult for them to use.

One issue which clearly emerges from the survey in Indonesia is that out of the 100 employees who have been interviewed, only one woman working on human resource development has received training on use of equipment, safety procedures, and risk aspects of her occupation, and none have benefited from any training on handling of chemicals and dangerous air and water emissions. The provision of adequate training could improve the situation both in terms of injuries which could be due to poor safety equipment and procedures, and in terms of preventing accidents caused by machines/equipment which are hard to use for workers, both men and women alike.

General training should be offered to all staff, regardless of their specific positions. It is important that all employees, including top managers, are aware of the positive and negative environmental impacts that their respective jobs may have. This is also a requirement of the International Organization for Standardization and its ISO 14001 on environmental management systems.

## 2.2 China

Chinese surveyed companies have recorded 79 accidents over the past 3 years. Interviewees have witnessed a total of 98 accidents caused by a machine/equipment which was hard to use for a worker over the same period. Despite the fact that accidents recorded by companies include all kinds of accidents, whereas interviewees reported only on accidents due to a machine/equipment being hard to use for a worker, the two figures are not incompatible, since, as already mentioned, employees may have witnessed and reported on the same accident which would then be counted more than once.

Like in Indonesia, also in China, the smaller size of enterprises does not seem to be a factor determining a higher level of accidents due to a machine/equipment which is hard to use for a worker. As a matter of fact, over the past three years, 11 accidents have been witnessed in firms with 250 employees or less and 87 in enterprises employing more than 250 people. The average number of witnessed accidents over the past 3 years in smaller firms is 0.42 compared to 1.17 in larger ones. Overall, the number of witnessed accidents due to a machine/equipment which is hard to use for a worker is low. Figure 3.2 illustrates these findings.

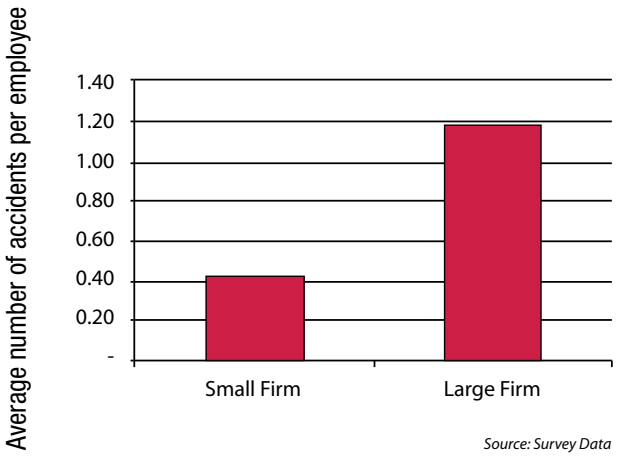


**Figure 3.2.** Accidents due to machine/equipment difficulty of use, over the past 3 years in small enterprises (250 employees or less) and large enterprises (more than 250 employees.)

Out of the 98 total witnessed accidents in Chinese enterprises, 19 happened because a female worker found it hard to use a machine/equipment. The large majority of accidents due to a machine/equipment which is hard to use concern male workers rather than females. This could be due to the small size of men which makes machinery difficult for them to use.

Unlike in the case of the surveyed employees in Indonesia, the large majority of interviewees in China have received training both on use of equipment, safety procedures, and risks aspects of their occupations, and on handling of chemicals and dangerous air and water emissions. This may account for the lower number of injuries suffered and witnessed accidents due to a machine/equipment which is hard to use for a worker. The following is an attempt to understand to what extent this is true.

Out of the total 100 Chinese interviewees, only 3 have not benefited from any training on use of equipment, safety procedures, and risks aspects of their occupations. These 3 individuals are women. If we consider that the 4 employees who reported having suffered from an injury over the past 3 years are men, we can conclude that training in this area may certainly have contributed to the overall low number of injuries experienced, but did not prevent those 4 male employees from being injured. It is also not possible to know whether those 4 individuals were trained before or after they were hurt.

As far as training on handling of chemicals and dangerous air and water emissions is concerned, the picture is quite different. Only 19 interviewees out of 100 have received training in this area. Perhaps this type of training is specific to certain tasks and jobs, and it is not necessary for just any employee to be familiar with such practices.

Available data does not allow any firm conclusion to be drawn about the impact of training on injuries and accidents due to a machine/equipment which is hard to use for a worker. If we compare data on injuries and witnessed accidents in China to those on Indonesia, it is likely, but not supported by concrete evidence, that training strongly contributed to lower

numbers. Stricter rules and regulations could be another factor accounting for the better performance of Chinese companies compared to Indonesian ones in this regard. In China, OSH legislation was introduced already in 1929 with the adoption of the "Factory Law", and a new OSH system was developed in the country as of the late 1970s to meet the challenge of an increasingly expanding SME sector.[19] In addition, since the 1990s, the OSH inspection system has been strengthened.[20]

It is also to be noted that, considering the higher quality of data provided by the survey conducted in China to address the next research question as opposed to the survey in Indonesia, one may conclude that training may have increased the level of awareness of interviewees about the environmental impact of their jobs.

## 3 Are women assigned more housekeeping tasks and environmental protection measures than men in firms?

Finding an appropriate question to address this issue was a real challenge since the phase of questionnaire design. Every single job may have negative impacts on the environment and, at the same time, include tasks which have beneficial environmental effects. In principle, employees should receive training in order to know what the positive and negative environmental impacts of their jobs are, but this is rarely done.

Shedding some light on what is meant by "housekeeping" at the workplace may help understand the difficulties encountered in the formulation of an appropriate question. According to the Canadian Centre for Occupational Health and Safety, "housekeeping" includes:[21]

- keeping work areas orderly,
- maintaining halls and floors free of slip and trip hazards,
- removing of waste materials and other fire hazards from work areas,
- paying attention to the layout of the whole workplace,
- checking aisle marking,
- ensuring the adequacy of storage facilities, and
- taking care of maintenance.

The same source adds that good housekeeping is a basic part of accident and fire prevention.

In order to measure housekeeping tasks and environmental protection measures, several options were proposed to interviewees. These include being in charge of cleaning, maintenance of machines, waste collection and disposal, security control, noise level control, receiving complaints from outside and inside the company on environmental or health issues, transport, storing, labelling, and specific production task. Interviewees were also given the option of adding any other specific environmental task.

### 3.1 Indonesia

As observed in the previous section, neither male nor female Indonesian interviewees have received any training on the environmental impacts of their jobs.

The lack of general awareness of the fact that every job has some environmental impact has resulted in answers which offer scarce information to properly address this research question. If on one hand a clear list of environmental/housekeeping tasks was offered in the questionnaire, many interviewees chose the option «Other (please specify)» and gave a brief description of their job with no environmental connotation.

Only 22 answers can be considered to try and address the issue of whether women are assigned more housekeeping tasks and environmental protection measures than men. The information available is very scarce and does not allow any firm conclusion to be drawn.

### 3.2 China

Chinese interviewees seem to have a better understanding of the type of environmental tasks that their jobs entail compared to Indonesian interviewees.

Several Chinese interviewees chose up to 3 of the 10 options which were offered in the questionnaire for environmental tasks. Moreover, a few interviewees added a couple of new categories, which are «production management» and «quality control management». Three of the proposed tasks were completely ignored. These are «transport», «storing» and «production (please specify)».

A total of 164 environmental tasks have been chosen by interviewees as tasks they perform in their job to protect the environment. Those tasks can be divided by 9 categories, as described above, and by gender.

Women are 34 in number and they chose a total of 49 environmental tasks. Men are 66 and totalled 115 environmental tasks.

As the chart below shows, there is a striking difference in the range and variety of environmental tasks performed by men as opposed to those performed by women. Female interviewees are certainly fewer than their male counterparts, but they selected only 4 types of environmental tasks as opposed to the 9 (more than double) which have been chosen by men.

19 Jin, K.; Courtney, T.K., "Work-Related Fatalities in the People's Republic of China", Journal of Occupational and Environmental Hygiene, 6(7), 2009.

20 Chunchang, S., "Boiler and Pressure Vessels Inspection in China", Asian-Pacific Newsletter on Occupational Health and Safety, December, 1(3), 1994.

21 http://www.ccohs.ca/oshanswers/hsprograms/house.html

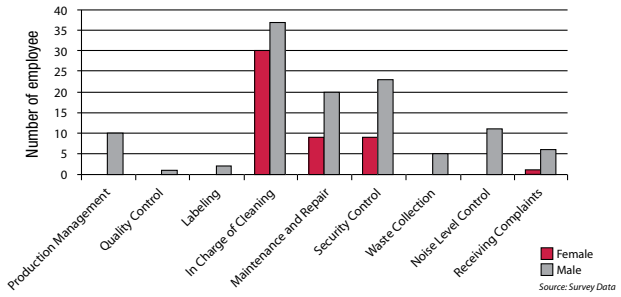


**Figure 3.3.** Employee's performing environmental tasks by gender and category

If we then consider the specific content of the tasks selected, women tend to be relegated to low-level jobs. For instance, although in the chosen sample women number one third of the sample size, they have opted for cleaning tasks 30 times, whereas men have chosen that option 37 times.

Unlike women, a large share of men seem to be in management positions with environmental tasks having a direct impact on the environmental behaviour of other colleagues. For example, 10 male interviewees are in production management positions, where they can play a pivotal role in environmental protection measures by determining the behaviour of employees operating in their production area. Figure 3.4 shows the level of environmental impact based on positions held by men and women. Clearly, since they have more influential jobs, men have a much more important role to play than women in environmental protection.

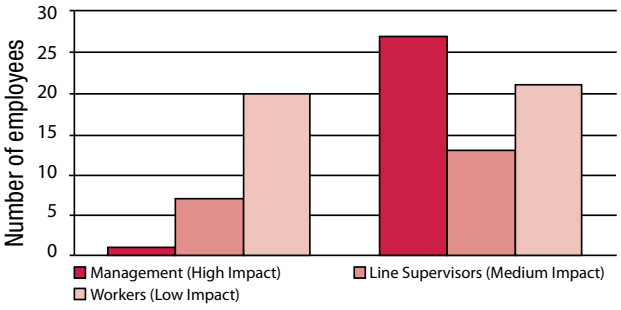


**Figure 3.4.** Employee's grouped into positional categories according to degree of environmental impact by gender.

A proportional number of men and women are involved in "maintenance and repair", and in "security control" tasks. The proportional distribution of these environmental tasks is certainly linked to the rather medium level of responsibility they entail, which is attainable both for women and for men in terms of career development.

## Conclusions

The research which the present paper has described provides for empirically-based answers to the three initial research questions:

- Are women exposed to greater occupational safety and health risks than men?

According to findings from the survey in Indonesia, it is clear that women experience considerably higher occupational safety and health risks than their male counterparts. These results conflict with national statistical data from different countries. It is to be noted, though, that statistical data on the manufacturing sector in general may not reflect the specific situation of the manufacturing of machine-parts sub-sector. Unfortunately, national data for Indonesia is unavailable. In general, more investigation is needed in this area, because, as described in section 1.2, injuries and accidents do entail costs and productivity losses.

Data on China show an overall low level of occupational safety and health risk for both female and male employees. Factors contributing to this better situation include training and possibly strict and enforced regulations, but also the difficulties which employees encounter in disclosing information and the barriers that companies erect, preventing their staff from disclosing sensitive data.

- Is machinery/equipment adjusted to women?

Findings from both Indonesia and China reveal that machineries and equipment are adjusted to women. Accidents which occur due to machineries/equipment which are difficult to use for a worker affect men more than women. This could however be due to the small stature of male employees which makes machinery difficult for them to operate.

- Are women assigned more housekeeping tasks and environmental protection measures than men in firms?

To answer this question we must rely on data from the survey in China. The answer is negative, because those environmental tasks with a stronger impact on the environment are performed by men. Even if women are better than men in the implementation of environmental protection measures, as the international literature clearly indicates, they are simply denied a chance to show it, because they are under-represented in management positions and it is by being in top-management jobs that one can make a difference in environmental protection.

This result has direct implications in terms of missed opportunities in productivity gains. If women were in management positions, the international literature presented in section 1.4 suggests that enforcing environmental management systems would cost less thanks to the higher degree of women's voluntary compliance.

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## Editor's notes

The opinions expressed are solely those of the author and do not necessarily reflect those of the International Labour Organization.

A longer and more detailed version of this paper is available on the ILO website: www.ilo.org/empent/Projects/score/lang--en/index.htm

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